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[YSF] Search for the compressed SUSY in stau-neutralino coannihilation region with a soft tau lepton and ISR jets

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A search for compressed supersymmetry in the stau-neutralino ($\tilde{\tau}\tilde{\chi}_1^0$) coannihilation region is presented. The search targets final states with exactly one low-energy ("soft") hadronically-decaying τ lepton and large missing transverse momentum ($\vec{E}_T^{miss}$) due to the natural kinematic boost from a high transverse momentum jet from initial state radiation (ISR). The data sample corresponds to an integrated luminosity of 77.2 fb^{-1} of proton-proton collisions at $\sqrt{s} = 13$ TeV collected with CMS detector at the CERN LHC in 2016 and 2017. The distribution of the transverse mass between the τ_h and the $\vec{E}_T^{miss}$ is found to be consistent with the standard model predictions. Upper limits are set on the cross section for chargino ($\tilde{\chi}_1^{\pm}$) and neutralino ($\tilde{\chi}_2^0$) production with an associated ISR jet. For a compressed mass spectrum scenario in which the mass difference between the $\tilde{\chi}_1^0$ and the $\tilde{\chi}_1^{\pm}$ is 50 GeV, an upper limit of 290 GeV is set on the mass of the $\tilde{\chi}_1^{\pm}$, which exceeds the sensitivity obtained by other $\tilde{\tau}$ searches to date. Finally, the results are also interpreted considering direct production of $\tilde{\tau}$ pairs with associated ISR jets.

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